Actas Urol Esp. 2016;xxx(xx):xxx–xxx

Actas Urológicas Españolas

www.elsevier.es/actasuro

ORIGINAL ARTICLE

Beyond the Briganti nomogram: Individualisation of lymphadenectomy using selective sentinel node biopsy during radical prostatectomy for prostate cancer☆

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Received 21 March 2016; accepted 1 June 2016

KEYWORDS
Prostate cancer;
Lymphadenectomy;
Radio-guided surgery;
Sentinel node;
SPECT/CT

Abstract

Objective: To validate the technique of selective sentinel node biopsy for diagnosing and staging intermediate to high-risk prostate cancer by comparing the technique with conventional extended lymphadenectomy (eLFD) in a prospective, longitudinal comparative study.

Methods: We applied the technique to 45 patients. After an intraprostatic injection of ^{99m}Tc-nanocolloid and preoperative single-photon emission computed tomography (SPECT/CT), we extracted the sentinel lymph nodes, guided by a portable Sentinella® gamma camera and a laparoscopic gamma-ray detection probe. The eLFD was completed to establish the negative predictive value of the technique.

Results: SPECT/CT showed radiotracer deposits outside the eLFD territory in 73% of the patients and the laparoscopic gamma probe in 60%. The mean number of active foci per patient was 4.3 in the SPECT/CT and 3.2 in the laparoscopic gamma probe. The mean number of extracted sentinel lymph nodes was 4.3 (0–14), with 26% outside the eLFD territory. The lymph nodes were metastatic in 10 patients (22%), 6/40 (15%) when the prostatectomy was the primary treatment. In all cases with metastatic lymph nodes, there was at least one positive sentinel node. Metastatic sentinel lymph nodes were found outside the eLFD territory in 3/10 patients (30%). The sensitivity was 100%, the specificity was 94.73%, the positive predictive value was 81.81%, and the negative predictive value was 100%.

Conclusion: Selective sentinel node biopsy is superior to eLFD for diagnosing lymph node involvement and can avoid eLFD when metastatic sentinel lymph nodes are not found (85%), with the consequent functional advantages.

☆ Please cite this article as: Monserrat-Monfort JJ, Martinez-Sarmiento M, Vera-Donoso CD, Vera-Pinto V, Sopena-Novales P, Bello-Arqués P, et al. Más allá del nomograma de Briganti: individualización de la linfadenectomía utilizando la biopsia selectiva del ganglio centinela durante la prostatectomía radical por cáncer de próstata. Actas Urol Esp. 2016. http://dx.doi.org/10.1016/j.acuro.2016.06.002

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PALABRAS CLAVE
Cáncer de próstata;
Linfadenectomía;
Cirugía radioguiada;
Ganglio centinela;
SPECT-TC

Más allá del nomograma de Briganti: individualización de la linfadenectomía utilizando la biopsia selectiva del ganglio centinela durante la prostatectomía radical por cáncer de próstata

Resumen

Objetivo: Validar la técnica de biopsia selectiva de ganglio centinela en el diagnóstico y estadificación del cáncer de próstata de riesgo intermedio y alto mediante comparación con la linfadenectomía extendida convencional (eLFD) en un estudio prospectivo longitudinal y comparativo.

Métodos: Hemos aplicado la técnica a 45 pacientes. Previa inyección intraprostática de ^{99m}Tc-nanocoloide y SPECT-TC preoperatoria, se han extraído los ganglios centinela guiados con gammacámara portátil Sentinella® y sonda detectora de rayos gamma laparoscópica. Se completó la eLFD para establecer el valour predictivo negativo de la técnica.

Resultados: La SPECT-TC mostró depósitos del radiotrazador fuera del territorio de la eLFD en el 73% de los pacientes y la gammasonda laparoscópica en el 60%. La media de focos activos por paciente en la SPECT-TC fue de 4,3 y con gammasonda laparoscópica de 3,2. La media de ganglios linfáticos centinelas extraídos fue 4,3 (0-14), el 26% fuera del territorio de la eLFD. En 10 pacientes (22%) se encontraron ganglios metastásicos, 6/40 (15%) cuando la prostatectomía fue el tratamiento primario. En todos los casos con ganglios metastásicos hubo, al menos, un ganglio centinela positivo. Se encontraron ganglios centinela metastásicos fuera del territorio de la eLFD en 3/10 pacientes (30%). La sensibilidad fue del 100%, la especificidad del 94,73%, el valour predictivo positivo del 81,81% y el valour predictivo negativo del 100%.

Conclusión: La biopsia selectiva del ganglio centinela es superior a la eLFD en el diagnóstico de afectación ganglionar, y puede evitar la eLFD cuando no se encuentren ganglios centinela metastásicos (85%), con las consecuentes ventajas funcionales.

Introduction

Pelvic lymphadenectomy is the most reliable and accurate method for the diagnosis and staging of lymph node involvement in prostate cancer (PCa).[1] This is due to the low sensitivity of current imaging techniques for the diagnosis of this disease in its micro-metastatic stage.[2,3] The excision limited to the obturator chain is definitely inadequate because it ignores about 50% of lymph node metastases.[4–6] An extended lymphadenectomy (eLND) should be carried out when the probability of lymph node involvement in the nomogram of Briganti is equal to or greater than 5%.[7] This, despite the therapeutic implications of the nodal involvement, is often dismissed[8] and may not be acceptable as purely diagnostic method since it is associated with morbidity.[9]

Our goal is to validate the technique of selective sentinel node biopsy for staging in patients with PCa. This paper is a prospective longitudinal and comparative study in patients with PCa in intermediate-high risk. Once this goal is achieved, we expect to reduce future surgical time and morbidity of eLND to stop the procedure when the intraoperative analysis of the sentinel lymph node is negative.

Patients and methods

Patients

Between January 2013 and November 2015 we performed the technique of selective sentinel node biopsy. It was completed with a pelvic eLND (obturator chains, external and internal iliac and to the junction of the ureter), to a total of 45 patients for validation purposes. The selection criteria included patients with localized PCa in intermediate and high-risk groups where Briganti nomogram predicted the probability of lymph node involvement equal or greater than 5%. All patients underwent abdominopelvic CT or pelvic MRI to rule out macroscopic nodal disease. We also applied the technique to patients with biochemical recurrence after primary treatment with radiation therapy. The prostate biopsy was negative and choline PET/CT showed metabolic nodal activity without evidence of macrometastatic involvement. The clinical characteristics of the patients are reflected in Table 1.

Injection of radiotracer and imaging

We have followed the description of Meinhardt for the procedure.[10] After the acceptance of informed consents, and coordinated with members of the Department of Nuclear Medicine, the injection of ^{99m}Tc-nanocolloid was performed the day before the surgery. It was guided with transrectal ultrasound (Fig. 1) punctured using a Chiba needle (0.95 mm × 220 mm) in the peripheral zone of both lobes and distributed into quadrants. In each injection 2.5 millicuries (mCi) of radiotracer (92.5 MBq) were administered in a volume of 0.6 ml saline to ensure its spread. The standard dose was 10 mCi (370 MBq). It is important to avoid injecting radiotracer near the bladder neck as it would spread over the bladder. The correct position of the